COBOLDIA FUSCIPES (MEIGEN) (NEMATOCERA: SCATOPSIDAE) FEEDING ON SLUG EGGS

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A NUMBER of Diptera are known to be parasites of slugs and slug eggs. As part of an investigation into the natural enemies of slugs, I collected a number of small Diptera to determine their role as parasites of slug eggs. The flies were collected in September 1992 from various sites around Close House Field Station, the University of Newcastle, Northumberland.

The flies were gathered with a pooter and transferred to a large conical glass flask containing moist filter paper and a batch of freshly laid eggs of the slug *Deroceras reticulatum* (Müller). A small beaker containing sweetened water was also placed in the flask. The mouth of the flask was covered with a piece of nylon net, held in place with a rubber band.

The flies were removed from the culture after they had all died. A few days later a number of scatopsid larvae were observed feeding on the slug eggs. The larvae were bred through to adults and the flies identified as *Coboldia fuscipes* (Meigen).

As the adults emerged, they were transferred to flasks containing moist filter paper with a fresh batch of slug eggs. The flasks were incubated at 20°C.

Scatopsid eggs were laid in batches of between 30 and 60 under the moist filter paper, but never in proximity to the slug eggs. Emerging larvae crawled over the filter paper and attacked the slug eggs with side-to-side movements of the head capsule.

Successful penetration of the slug eggs appeared to depend on the number of larvae attacking the egg. When individual first-stage larvae were isolated on slug eggs, they would die without penetrating the eggs. However, when the slug eggs were punctured (with a pair of forceps), the larvae entered the eggs to feed. Individual third and fourth-stage larva were able to penetrate the slug eggs themselves.

First and second-stage larvae were often observed completely submerged in a slug egg. Third and fourth-stage larvae were often found submerged in a slug egg with just their posterior spiracular projections above the egg surface. Bovien (1935), thought that long posterior spiracles were an adaption to damp habitats, and that the length of the spiracles in individual specimens was determined by the experimental conditions – longer spiracles in wetter conditions. However, larvae of all stages were free ranging and moved over the egg surface. Third and fourth-stage larvae often left the slug egg mass and crawled over the filter paper. After several days the slug egg mass was liquified and eventually consumed.

Larvae left the slug egg mass to pupate on the filter paper. At 20°C approximately ten days passed between the larvae hatching and pupating.

Larvae developed and pupated at 8, 12, 16 and 20°C, development time being shortest at 20°C.

At 20°C the pupation period from the first generation was between four and eight days. However this had increased to between 10 and 13 days by the second generation. The reason for this was unclear as the culture (which had arisen from a single gravid female) was still viable and a high emergence rate was evident even after several generations.

Several subsequent generations of *C. fuscipes* were cultured on eggs of *D. reticulatum* and eggs of the slug *Arion hortensis* (Ferussac). When eggs of both slug species were presented to the larvae together, *A. hortensis* eggs were preferentially attacked and consumed before those of *D. reticulatum.*

Unfortunately, *A. hortensis* eggs became increasingly hard to find as winter progressed. A *Drosophila* culture medium was successfully used to rear several more generations of *C. fuscipes.* The larvae ate the culture medium in preference to *A. hortensis* eggs.

Larvae of *C. fuscipes* (= *Scatopse fuscipes* Meigen) have been found on a variety of decaying plant and animal materials (Cook, 1974), including green ginger (Lyall, 1929), wasp nests, bulbs and onions, excrement, wastes from fruit and wine canneries.

Keilin (1921) gave an account of a number of Diptera larvae which fed on Mollusca. Trelka & Berg (1977) gave a detailed account of two *Tetanocera* species (Sciomyzidae) attacking slugs. Stephenson (1965) reported larvae of *Tetanocera elata* Loew infected 14% of *D. reticulatum* collected on an abandoned allotment at Rothamsted. Reidenbach *et al.* (1989) gave an account of *Euthycera cribrata* (Rondani) (Sciomyzidae) attacking *D. reticulatum.*

Robinson & Foote (1968) detailed the mode of attack of the phorid *Megaselia aequalis* (Wood) on eggs of the slug *Deroceras laeve* (Müller). Between one and three phorid eggs were laid on a slug egg. The larvae penetrated the slug egg using a small sclerotised spine. The first and second-stage larvae were confined to feeding on the egg. Third-stage larvae left the egg to assume a more predatory role and broke into other eggs with repeated slashing movements of their mouthhooks. This slashing movement was observed in the present study with *C. fuscipes* larvae, however, the inability of first and second-stage larva to penetrate slug eggs individually rules out any degree of specialisation.

I believe this is the first time that a scatopsid has been reported to feed on slug eggs.

Acknowledgements

I would like to thank Mr Nigel Wyatt of the Natural History Museum for identifying the flies and Jan Woodward for her help in culturing the flies. This work was completed whilst I was supported by a MAFF studentship.

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Hazards of butterfly collecting – a first brush with science – Copenhagen, 1958

It was summer, 1958. I was on holiday with my parents in Denmark, otherwise being at boarding school in an obscure village in the Nilgiri Mountains of southern India. I was fourteen. In those days there was not yet the present jetting around the world at the drop of a hat. A two-year tour was just that. For two years no visits to Denmark, and no visitors from Denmark. I had little opportunity for museum and library researches. Thirty years later, more than a dozen friends and relatives paid visits to Delhi during a two-year tour, and I was in Denmark for consultations twice.

From the Nilgiris I had brought with me a *Neptis* butterfly that I was quite certain ought not to be found there. That genus has only two members in Europe, but even they have been known to cause confusion. Asia and Africa has a plethora of *Neptis* which are very much worse.

I had plucked up the courage to phone the Zoological Museum in Denmark to set up an appointment with the insect curator, Dr S.L. Tuxen, who will be familiar to many readers through his famous book on the genitalia of insects. He was a kind and patient man who was always willing to help budding entomological talent, and soon we were in his laboratory, surrounded by dozens of cases of *Neptis*. A little later, scores of butterfly books and obscure papers were dug out. Was it this one? That one? Well, yes, but no! After an hour or so, Dr Tuxen said "Look young man – I'm afraid that you have me stumped. I don't think I can tell you what it is".

I was shattered by the enormity of this statement! Here was a *scientist*, and he could not identify a butterfly I had caught! Tuxen must have sensed my disquiet. He patiently explained to me some of the intricacies of taxonomy and identification, and for the first time I realised that even in the scientific world things are not as clear-cut as our school books would have us believe. Tuxen also enrolled me in the Danish Entomological Society and waived the membership fee for as long as I remained in India.